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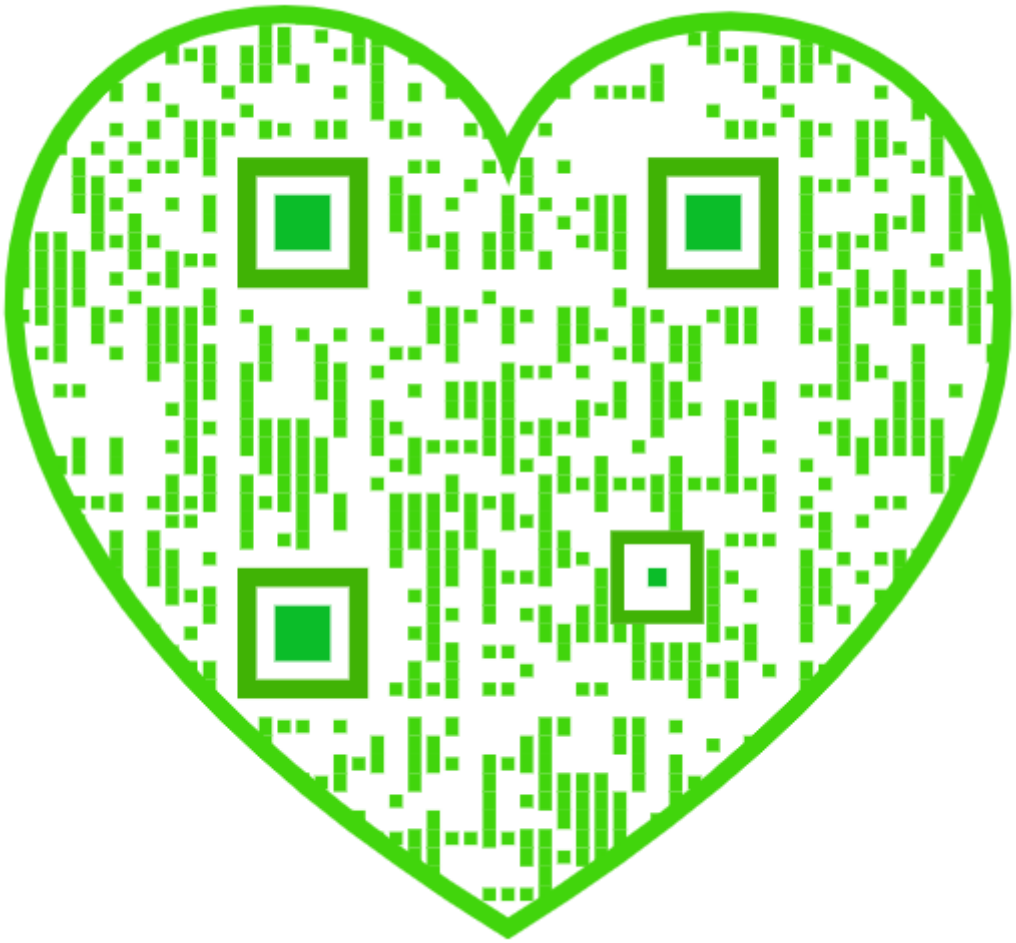
The Carriage Painters Manual



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THE

CARRIAGE PAINTERS'

ILLUSTRATED MANUAL.

CONTAINING

A TREATISE ON THE ART, SCIENCE, AND MYSTERY OF

COACH, CARRIAGE, AND CAR PAINTING,

INCLUDING THE LATEST IMPROVEMENTS

IN

FINE PAINTING, GILDING, BRONZING, STAINING, VARNISHING, POLISHING, COPYING, LETTERING, SCROLLING, AND ORNAMENTING,

WITH

AN APPENDIX,

CONTAINING USEFUL SUGGESTIONS, RECEIPTS, ETC.; A LIST OF THE PRINCIPAL VARNISH MAKERS AND DEALERS; A CORRECT LIST OF CARRIAGE AND WAGON-MAKERS IN NEW YORK CITY.

Adapted to the Wants of Every Painter.

BY F. B. GARDNER,

A PRACTICAL NEW YORK COACH AND ORNAMENTAL PAINTER.

NEW-YORK:

S. R. WELLS, PUBLISHER,

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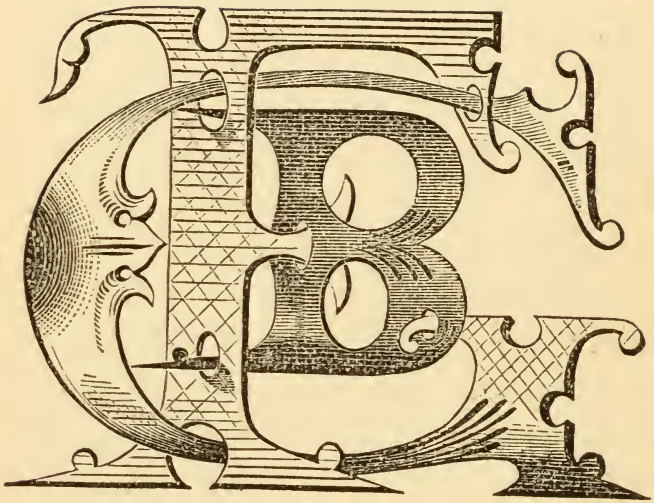


PREFACE.

THIS book is designed to present a clear and concise statement of the principal methods employed in Fancy and Carriage Painting; and to form a reliable Manual for the experienced workman, as well as the apprentice. Having been practically engaged in the business since 1850, and having paid great attention to the art, science and mystery of fine painting, I have, in common with others, met with many difficulties, which careful experiment and perseverance have overcome. Therefore, in laying before my readers the results of my own experience, it is with the hope that my endeavors to aid my fellow craftsmen will not fail of appreciation.

I will detail the methods usually employed by others, and the various processes which have appeared to me to answer best, because of their simplicity, certainty, and economy, and I will then leave the reader to judge for himself which method is most deserving of his practical consideration.

THE AUTHOR.

THE PAINTERS' MANUAL.

PART I.

THE TOOLS USED.

IT is unnecessary for me to enter into details as regards the equipment of the shop, for that is constituted according to circumstances; suffice it then to say, a paint shop should be clean, tidy, and well lighted.

The tools, colors, varnishes and liquids with which we do our work are of the first importance, and I will describe those generally used in first-class shops, and those which experience has taught me to be the best.

The first tool which claims attention is the paint mill. The best, and one commonly used by carriage painters, is Harris' mill, manu-

factured at Waterville, New York. This is made of different sizes, and possesses an excellent feature in that when the grinding surfaces are worn by long use, they can be filed by any handy man with a saw-file and a round-file, and so made "as good as new."

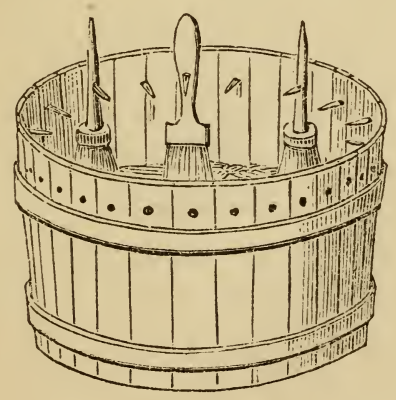
The next tool in order, is a marble slab, or "stone," with its accompanying "muller." Besides, we have also a medium-sized palette knife, and one or two good putty knives, cups for colors and varnishes, pails, sponges, chamois skin or "shammy," dusting-brushes, water-brush or tool, scraping irons, and a "burning off" furnace. These comprise the "rough" tools, and will be found indispensable adjuncts to a well-arranged paint shop.

BRUSHES.

FOR painting carriage parts, and for first coats on bodies, we require *bristle* brushes. The best for the purpose are medium-sized oval

varnish brushes, as they invariably wear better, and are cheaper than low-priced brushes. We also require flat bristle-brushes of various sizes. The small or one-inch ones we will call "tools," to be used in cleaning up on carriage parts. The same quality and kind of brushes are used in varnishing, and reference will be made to these in other pages.

All bristle brushes should be kept suspended in water; and the most convenient way is shown in the engraving, much better than by any written description I might give.



Nails are driven through the staves of a tub, at such a distance from the bottom that the water never should be allowed to reach above the binding of the brushes. The brushes, when suspended by them, should barely touch the bottom.

For fine colors, or last coats, *flat* camels'-hair brushes or blenders are used; these are bound in tin, and when new, care should be taken to tighten the hair by an easy squeeze in a vice, of the lower part of the tin binding.

Several of these brushes are required for different colors; it being a bad plan to change them from color to color,—and different sizes are needed, from one inch to three or three and a half inches, wide enough for the quarter or back panels of a coach.

These should be kept clean by rinsing lightly in turpentine, wiping with a rag, and then being suspended in water, the same as bristle brushes. Some painters hang their

brushes in turpentine, but this practice is found to be injurious, as it softens or rots the hair, which breaks off in minute pieces when coloring a panel or other work, and causes more or less trouble.

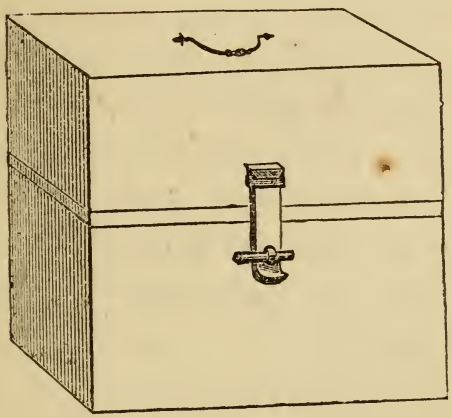
VARNISH BRUSHES.

THERE exists among painters various opinions with regard to varnish brushes, some contending that bristle brushes are *best* for all work, others, that fitch hair brushes are best; and others will use none but "Philadelphia brushes." The latter are bristle, ground to a chisel edge.

I will simply offer my "ideas" in this matter, and leave the "pudding to be proved by the eating."

I find the best and most reliable varnish brushes to be both bristle and fitch-hair. For heavy work, such as large panels on clarences, coaches, etc., I use the best quality

of elastic bristle brushes, made with a chisel edge, but not ground. The brushmaker takes the required quantity of bristles for a brush, and draws back the outside bristles on each side of a centre line, equally and evenly, forming a chisel or beveled edge, thereby leaving the *split end* of the bristle on the brush—*not ground off;* and the consequence is, that the brush is softer and more elastic than the other description of brushes. These brushes can be procured at the principal brush stores, and you should be careful in selecting them; for a "laid" brush is worth two of those which are "ground." A set from one inch up to three inches in width for finishing coats, and another set for American or rubbing varnish are needed; for it will be found that a good job cannot be so certain, if the varnish brushes are used for every kind and class of work. Have a can made to suspend them in, as represented in the accompanying engraving, with a tight division



in it, one side being for the finishing brushes, which should be hung in English varnish, and the other for rubbing varnish brushes, which should be hung in American varnish—care being taken to keep them always clean, and never allowing a change to be made.

FITCH-HAIR VARNISH BRUSHES.

I DO not wish it to be understood that but *one* variety of brush is required; for fitch-hair brushes are indispensable. We do not always

have large jobs, or put on heavy varnish, therefore for buggies, small panels, or parts of heavy work, as coaches, landaus, bretts, etc., it is necessary to use those small soft tools which lay the varnish so evenly. The best quality sell for $1.00 per inch, while a poor imitation—and one perfectly worthless—can be had for sixty cents. Always purchase this kind of brush from a well-known dealer.

In varnishing carriage parts, the kind described for painting, will be found excellent. These may be kept in the can with the rubbing-varnish brushes. It is well to have always at hand an old brush to be used on touching up or repaired work. These brushes also, should be *bound;* that is, have an extra binding, extending over at least one-third the length of the hair, when new, or they will become "flabby" and not work so well. A description of "how to bind a brush" is given further on in these pages.

STRIPING PENCILS.

THESE can be found at any supply store, ready made, in quills of various sizes and quality. But I prefer making them myself, if for fine lines, as they will be cheaper and work better. Camel-hair striping pencils are good enough for ordinary work, or broad lines, but one should be particular to select those with dark-colored, straight hair about one and a quarter inches long. These you can cut to make fine liners, or put two together for broader lines. Sable-hair striping pencils are considered best by some painters, but I use them only for fine liners. The flat pencils are preferable, as you can draw a longer line before refilling the pencil with color, thereby saving time in striping.

TO MAKE A FLAT STRIPING PENCIL.

TAKE a piece of hickory and cut it in the shape shown in the engraving at C; split the

end carefully, as at A ; cut two notches, shown at B ; then take from a large sable-hair pencil the desired quantity of hair, and insert the ends evenly, and thinly in the split. The best way is to stick a pin into the split to hold it open, and when the hair is put in, pull out the pin. The wood when released will spring together, and a piece of thread tied around in the notches will hold all together firmly ; cut the extreme point carefully with a sharp knife, and the work is finished. These pencils are used by holding them edgewise to the work and allowing but one half the length of the hair to touch—a knack easily acquired.

Ox-hair pencils have been introduced lately, and are found excellent for fine or medium lines, where heavy color is used. They are made from the hair which grows in the ear of an ox. They are not expensive, and I advise

a trial of them. They can be found at almost any carriage-painter's supply store.

ORNAMENTING PENCILS.

ORNAMENTING pencils are bound in tin or brass, with long cedar handles. The best are sable-hair, costing from ten to fifty cents, according to size. Some very fine ones are made expressly for painting ornaments, crests, monograms, etc., on carriages, and will serve many purposes on fine work.

LETTERING PENCILS.

THE best lettering pencils are of sable-hair, and are in quills, the same as striping-pencils, but the hair is shorter. "Wagner's black sable pencils" will be found excellent and not apt to "crinkle" in heavy lead colors. Camels'-hair lettering pencils are well enough for some work or for light-bodied colors, but

I do not advise their use, as the sables are so far superior. I have used one of "Wagner's" pencils seven months, constantly, every day, on soda and sarsaparilla wagons, milk and pedlar wagons. There is a lettering pencil now in market bound in tin, but I believe they are no better than the quill pencil.

Striping pencils should be well rinsed after use, and well greased with tallow, (from a two-cent candle,) then spread evenly on a piece of glass and kept in a box out of the dust. Lettering and ornamenting pencils may be greased and laid carefully away in a box, and when well rinsed in turpentine they will be ready for use. Another tool for striping, and one which deserves particular notice, is a "mathematical" pen. It is generally adjusted to a pair of dividers; a beautiful stripe can be made by it on panels, or on any part where the dividers will work. The colors used with the pen must be mixed in beer, or vinegar to which a little sugar is added. Fill the pen

with a short-hair camel brush. Do not dip the pen in the paint. A little practice will enable you to master the art of using this tool, and no painter will be without one when he has proved its efficacy.

There is a patent striping machine for panel work, which answers a very good purpose, which was invented by George Crossingham, Croton Falls, New York, but it is not yet in general use.

PALETTES.

FOR lettering or ornamenting, we use the usual artists' palette, which can be found almost anywhere in the paint stores. For striping, I use a palette made of zinc, that metal being very easily cleaned, and always presenting a smooth surface. A piece four or five inches long and two inches wide, is all that will be required; and you must never

heat it to remove dried paint, but wipe it off after use, with a rag and turpentine.

TUBE COLORS.

TUBE colors, for ornamenting and striping, are decidedly the best. I give below a list of those most frequently used. They will dry in twenty-four hours, but if a quicker drying be desired, a little sugar of lead (which is to be had also in tubes) may be added, which will not affect the colors, like most other driers. A mixture of these colors can be made to secure any desired shade.

LIST OF TUBE COLORS.

Asphaltum,
Antwerp Blue,
Blue Black,
Bone Brown,
Bitumen,
Carmine,
Vermilion,
Light Red,
Indian Red,
Venetian Red,

Brown Ochre,	Yellow Ochre,
Burnt Roman Ochre,	Burnt Sienna,
Burnt Terraverde,	Raw Sienna,
Chrome Yellow,	Burnt Umber,
Chrome Green,	Raw Umber,
China White,	Madder Lake,
Chinese Vermilion,	Ivory Black,
Flake White,	Verdigris,
Cremnitz White,	Vandyke Brown,
Snow-White,	Emerald Green,
Indigo,	Ultramarine,
Italian Pink,	Prussian Blue,
Kings Yellow,	Chinese Blue,
Naples Yellow,	Terraverde,
Olive Lake,	Yellow Lake,
Munich Lake,	Sugar of Lead,

Drop Lake,

and fifty other colors, which can be found in the catalogues of supply stores; but the above are those *principally* desired.

ORDINARY COLORS.

First on the list of colors, is White Lead, from the fact that it forms the base or foundation of all our work. There are but two brands which I can recommend with confidence. Jewett's (Am.) and Atlantic (Am.). These brands will be found of uniform quality. and as good lead goes farther than common or low-priced lead, it is cheaper in the end. I shall use the term "keg lead," when speaking of this color in these pages, to distinguish it from dry white lead, which is used often, and is an excellent article for many purposes where we do not desire oil.

Keg lead is used *pure* for first coats or priming on all our work, and is mixed with *raw* linseed oil only. We mix the paint quite thin, as it is our desire to fill the grain of the wood, rather than plaster a thick coating of paint on the surface. When white is used as a color—as on stages, express, or pedlers'

wagons,—mix the keg lead with turpentine, adding a little rubbing varnish to bind the paint and assist in drying; a little oil may be also added when great durability is aimed at.

OTHER PRIMARY COLORS.

Lampblack,
Drop, or Ivory Black,
Prussian Blue,
Paris, or French Green,
Ultramarine,
Rose Pink,
Chrome Green,
Indian Red,
Emerald—dark Green,
Red Lead,
Chrome Yellow,
Engl. Vermilion, deep,
" " light,
Orange yellow,
Crimson Lake,
Yellow Lake,
Scarlet Lake,
Carmine,
Dutch Pink,
Turkey Umber, Raw and Burnt.
Italian Sienna, Raw and Burnt.
Trieste,
Chinese Blue,
Chinese Vermilion,
Venetian Red,
English Filling,

American Vermilion,	Red Lead (Eng.)
Munich Lake,	Metallic Paint,
Drop Lake,	Yellow Ochre,
Florentine Lake,	Vandyke Brown,
&c., &c.,	&c., &c.,

GRINDING BLACK.

IT is the usual plan to grind drop or ivory black, when mixed with Japan or rubbing varnish, but I frequently mix that color when I wish to have it extra fine, as follows :

Mash up the lumps on the "stone," and mix with turpentine to the consistency of thick paste ; put it in the mill, add a very little Japan, and grind the mixture as fine as the mill will work. Then add a little rubbing varnish to bind the color well, and it will be found a very excellent working color.

My theory for this method of mixing black is, that turpentine being very volatile, is absorbed by every small grain of black, and

consequently softens the same, so that it grinds to an "impalpable" liquid; while color mixed with Japan or varnish is not softened, but a slimy material is produced, which merely covers the fine grains, and they are not dissolved, as by turpentine. This plan is easily tried, and if you do not agree with me I very much mistake.

Always bear in mind that colors must be mixed with Japan, varnish or oil, to bind the paint; while turpentine is used chiefly as a vehicle to enable the color to be spread evenly and smoothly.

In mixing ultramarine blue with oil, it will frequently be found to "crawl" or "run;" this can be obviated entirely by adding a few drops of water or spittle to the mixture, which causes it to take the form of a paste, and prevents any further "running" or "crawling." Ultramarine is, I believe, the only color so affected, and it is also the worst color to "run," notwithstanding it is one of the "trio"—red,

white, and blue,—which are said to *never* "run."

TO PREVENT VERMILION FROM FADING.

ENGLISH Vermilion should be mixed with rubbing varnish and oil, instead of Japan, as the latter has a tendency to injure the color.

Light English Vermilion is used for striping and ornamenting or lettering ; the deep vermilion having less body, will not cover good.

Vermilion is well known to fade or turn a blackish brown ; this can be obviated, and the color preserved for a long time, by adding to the dry color before mixing, one-eighth part of flowers of sulphur, which can be obtained at any drug-store. The old masters used this secret in their paintings, and their colors are known to stand the wear of years.

American Vermilion should never be ground, as the process would change it to an orange color ; while green, Indian red, chrome-yellow,

and all heavy body colors are better, if ground as fine as possible. Raw oil is preferable to boiled ; it being more volatile, penetrates the pores of wood better, and forms a harder and more durable surface for the succeeding coats.

PREPARED COLORS.

I WOULD here call the attention of the reader to the prepared colors of Masury and Whiton, Globe Lead Works, of New York. These colors are mixed in Japan or varnish, and ground very fine ; they dry very quickly and "dead." Having used the ivory black, prepared by the above firm, I can recommend it as superior to anything else of the kind I ever tried. These colors are prepared expressly for carriage painters, and every color desired can be obtained at the principal stores, in cans or pails, ready for use. For painters who have no conveniences for grinding or mixing colors, they will prove of great value.

COMBINATION OF COLORS.

THE various shades and tints which can be produced by mixing different colors are so numerous, that I will curtail my remarks on this subject, preferring to leave the reader to discover by experiment desired shades, as the knowledge thus obtained will be of greater use and value than any written rule. The "strength" of colors, also, varies, so that no particular quantity of each can be safely advised. However, to aid the amateur, the following suggestions may be of service.

Lead color,	Keg Lead and	Lampblack.
Pearl "	"	Prussian Blue and Red.
Salmon "	"	Blue, Yellow and Red.
Drab "	"	Yellow Ochre and Black.
French Gray,	"	Black, Blue, and Red.
Pea Green,	"	Chrome, or Paris Green.
Slate color,	"	Black, Red and Blue.
Cream "	"	Yellow and Red.
Straw "	"	Yellow.
Fawn "	"	Ochre and Vermilion.

Peach-blossom,	Keg Lead, &	American Vermilion.
Purple color,	"	Blue and Red.
Rose "	"	Carmine or Lake.
Silver Gray,	"	Blue and Black.

The above are all mixed with keg lead for a base, and the colors added to suit the taste of the painter.

Brown,	Indian Red and Black or Blue.
"	Venetian Red and Lampblack.
Dark green,	Lampblack and Chrome Green.
Orange,	Red and Yellow.
Grass green,	Green and Blue.
Olive,	Red, Green, or Black, Yellow and Red.
Snuff-color,	Yellow, Sienna and Red.

PART II.

CARRIAGE PAINTING.

FOUNDATION.

To illustrate clearly the method of painting a new carriage, we will take a buggy and carry it through its various stages from the smith-shop to the trimming-shop, and finish it for the repository ; and here I would remark that the process will be the *same* for heavy work, such as coaches, clarences, broughams, bretts, rockaways, etc., with the exception that on the latter class of work we must, to insure good work, put on, perhaps, more paint in the foundation, as the style and finish are superior and the work in general is expected to wear longer than light buggy work.

The body, having been finished by the body-

maker, is brought to the paint shop. We dust it thoroughly to remove all saw-dust and dirt, and proceed to coat it with priming. See page 34. Every nail-hole and crack is well filled, and the priming well rubbed into the grain of the wood. For this work a well-bound brush, or a brush partly worn, is best. Clean out all corners with a small stiff brush, leaving no patches of paint on any part of the job. The wheels, beds, bars, shafts, etc., of the carriage part being at hand, we give them a coat of the priming also, and they are then ready for the blacksmith. The body will require more paint, and while the smith is "ironing" the running part we will "fill up" the body.

Three or four days having passed since we "primed" the body, we sandpaper it lightly to smooth the grain and remove any lumps of lead, with No. 2½ sandpaper; then put on a smooth, even coat of No. 1 lead (See Page 22), set aside to dry hard, and perhaps in two

days this coat will be hard enough to "putty up." (See Putty, page 35). When the putty is dry, sandpaper again; dust well and apply paint No. 2 (page 65). Allow this to dry, then putty up all the small holes, cracks and imperfections, plastering over with soft putty every part where the grain is course or very open. After the body has stood long enough to dry, paint No. 3 is then next in order.

A great deal depends on the paint being perfectly dry before another coat is put on, and therefore give all the time possible between each coat. The third and fourth coat of lead having been put on, everything puttied up smooth, and all dry, we are ready for the

ROUGH STUFF.

SOME painters use yellow ochre for a rough stuff; others, mineral or fire-proof paint, and others still, English filling (ground slate). I prefer the latter, mixed as follows:

Take three parts of filling, two parts dry white lead, one part keg lead; mix with Japan two parts, rubbing varnish one part; dilute with turpentine; and run these components through the mill to crush the lumps and thoroughly mix them.

Three coats of this is now put on the principal parts of the body, each coat being allowed time to dry hard. (For heavy work I advise more); then, to enable us to see, when rubbing, that the surface is level, we "stain" the whole with lampblack mixed in Japan and turpentine.

Yellow ochre rough stuff, when looked at with a microscope, after being rubbed, presents a porous appearance like the end of a piece of rattan, which shows the cause of varnish "flattening" or striking in on many jobs; yet, there are jobs done with this pigment used as a filling where no imperfections can be found in the finish. English filling forms a slate-like surface, perfectly

solid, and years of use have proved it to be about the best filling.

The body being now ready for ironing, we will look at the foundation coats, and see how they are mixed.

PRIMING.

Mix keg lead to the consistency of milk—country milk—with pure raw oil.

No. 1, OR FIRST COAT OF LEAD.—Mix keg lead with raw oil two parts, Japan one part, to make it proper for a thick coat, adding a very little turpentine to allow it to work easily. For carriage parts add a little lampblack, but not for bodies.

No. 2, OR SECOND COAT OF LEAD.—Mix keg lead with one part raw oil and two parts Japan, and a little turpentine, as before, adding lampblack for carriage part, but none for the body.

Nos. 3 AND 4, OR THIRD AND FOURTH COATS.—

Mix keg lead into a thick paste with turpentine, add a little oil, Japan and rubbing varnish to bind the paint well; add, for the carriage part, a little lampblack, and if handy, a little red lead, which will make it sandpaper nicely.

HARD DRYING PUTTY.

Mix dry white lead with Japan and rubbing varnish equal parts, to the proper consistency, beating it well with a mallet to thoroughly mash the lumps. Keep it, when not in use, in water, to prevent it from drying.

If it be necessary to put on more paint to properly fill the grain of the carriage part, the Nos. 3 and 4 will answer all purposes. These lead colors should all be ground as fine as possible; they will then fill up the wood better and go farther, besides necessitating less sandpapering.

The buggy having now arrived from the

smith-shop, we will "strip the job," *i. e.*, take off the body, remove the loops, dash, steps, and foot-rail, and prepare to rub the body

OUT OF ROUGH STUFF.

THIS is done by rubbing the surface with lump pumice stone and water. Here I would call the reader's attention to a prepared stone for rubbing made into cakes of convenient size and shape, and of various degrees of "grit." I have used it and find it an excellent article. The maker's name is forgotten, but it can be found at the principal stores.

The pumice stone having been cut with an old saw and filed level, or into various shapes, we proceed with the rubbing, keeping the surface well wet with water, as the stone cuts faster and is less liable to scratch, when plenty of water is used.

Take care not to rub more than is sufficient to take off all the stain; wash off clean with

cold water, and dry thoroughly. It is very probable that small dents or scratches will be found in the surface, and to make sure of a perfect foundation for the color, we will prepare some

FACING LEAD.

MIX dry white lead with two parts Japan, one part rubbing varnish, and thin with turpentine, adding a little lampblack to make a clean-looking lead color. Grind as fine as possible, rub the body off lightly with No. 1 sandpaper, dust well, and apply the facing lead with a camels'-hair brush, laying the paint on evenly and quickly. When dry, which will be in five or six hours, go carefully over with soft putty and fill all scratches or imperfections perfectly. Allow all to harden; then with the finest pieces of pumice stone gently rub or "face it down;" wash off; clean out the corners, and the body is ready for coloring.

The irons of the body, such as steps, loops, &c., are also ready for color, having been previously leaded.

THE CARRIAGE OR RUNNING PARTS.

TAKE No. 2½ sandpaper and cut down every part of the carriage, until there appears to be nothing but the new wood and iron left, taking care not to cut the corners of the spokes, bars, etc. By this means you remove every particle of blacksmith smoke, dirt and grease, and will provide against trouble in future operations.

The lead color No. 1 is now put on, using the oval brushes and "tool;" the latter being used to wipe around nuts, between spokes and springs. Allow time for drying, and then putty up all the large holes; sandpaper and apply No. 2 (page 65). Repeat this process until the third and fourth coats are hard and dry; then with partly worn sandpaper prepare it for the color.

COLORING CARRIAGE PART.

LET us suppose carmine to be the color desired. We mix a preparation or ground color for vermilion, *i. e.*, keg-lead and American vermilion to a light pink color, with Japan, varnish and turpentine, grinding very fine and laying on with a camels'-hair brush. When dry we put on deep English vermilion, and when that coat of "dead color" is dry, add sufficient rubbing varnish to make coloring varnish, and apply a heavy coat. This, when dry, is to be rubbed with pulverized pumice stone and water, using a thick woolen cloth for a rubber. Wash off, dry well with a "shammy," and if it is to be striped black, we will stripe it before putting on the carmine.

The striping being finished (a double fine line of black), mix French carmine, No. 40, with English hard drying varnish, and grind as fine as possible. Then add more varnish,

that the color be not too strong ; and apply with a fitch-hair brush. The English varnish will require at least forty-eight hours to dry, unless a little gold size has been added, and as we have already gone ahead a little too fast, we will look at the body. This we will suppose to have had a good coat of preparation, *i. e.* lampblack, a good coat of ivory black, and a coat of black coloring varnish.

Black coloring varnish can be made by adding "dead color" to rubbing varnish, but a far superior article can be obtained from Messrs. Smith, Baldwin and Company, of New York. This firm furnishes a black coloring varnish, made with English ivory black, and their rubbing varnish ; it dries quickly, sets conveniently, and is by far the best article in the market. Use a fitch-hair brush to put on the coloring varnish. The body and carriage part are now in coloring varnish, and the carriage part is glazed with carmine. We will now give the body two coats of rubbing var-

nish, rubbing with fine pumice stone between each coat, and the trimmer can then put in the seat linings, etc.

VARNISHING.

THE varnish-room should be well cleaned, walls dusted, floor well wet, and if the weather is cold, a temperature of seventy-five or eighty degrees maintained by a clean tight stove, or what is better, steam-pipes. The carriage part and body having now been nicely rubbed down and well cleaned, we begin with the carriage part. Raising all the wheels from the floor by two boxes or barrels placed under the axles, we prepare the varnish and brushes. American finishing varnish is good enough for this part, and with our oval varnish brush and flat "tool" we take our position in front of the wheel with our left hand on the rim to turn it; with the "tool" we spread the varnish heavily between the spokes, and up the front

as far as the V shape of spokes extend; then with the large brush we lay on an abundance of varnish on the side of the spoke nearest our left hand, then opposite, and then reach over and cover the back.

Now wiping out all the varnish in the brush on the edge of the cup, we repeat the operation with the dried brush, laying off the varnish smoothly and removing the bubbles. Next we varnish the hub, and wipe with the "tool" around the "butt" of the spokes; then varnish the inside of the rim between the spokes, finishing the back and front sides last. We keep the wheel turning for a moment or two until the varnish flows evenly, and proceed with the other wheels in the same manner, finishing the springs, axles, etc., lastly.

The body is next looked after. Taking our body finishing brushes (the fitch hair brushes are best for the buggy), and for finishing bodies I prefer Noble & Hoare's hard-drying varnish and Harland's wearing body-varnish,

mixed in equal parts, we begin with the inside—for which we should have a pair of brushes and a cup expressly. In laying on a heavy coat, we level it off nicely, leaving the brush marks faintly perceptible up and down the panels, always leaving the work before it begins to set.

The outside we next look after, and flow the varnish on very heavily, but as evenly as possible. We lay off from end to end, then across from bottom to top, and repeat; wiping out the brush on the cup, and leave the panel with the last movement up and down. We clean out under the mouldings with a small brush, and bear in mind that a heavy flow must be wiped upward, never down. Having been all over the body, with a piece of whalebone—which should be at hand, one end being sharpened to a point—we go over the work, picking out any hairs, dust, etc., and then close up or darken the room and leave the job to dry.

In cleaning a body preparatory to varnishing, I find it an excellent plan to use, after dusting with the dusting-brush, a piece of silk (an old sun curtain for instance,) dampened with sweet oil. With this I gently wipe the job over, but not enough to grease the surface, and it removes every little particle of dust or lint left by the shammy and duster.

VARNISHES.

THERE is no class of people more pestered with peddlers, if I may so term them, than carriage-makers are with varnish agents. Every few days an agent of this sort makes his appearance, and sometimes proves an intolerable bore. I do not frown upon the enterprise and go-a-head-a-tive-ness of the agent or his employers, for such a spirit is well enough; but I have frequently had occasion to object to the perseverance of such men in seeking the foreman, after a denial from the "boss," and

trying sometimes by bribery, to get him to assist with his influence in introducing the vaunted varnish. Some bosses, to get rid of the agent, order varnish "for trial," and the workman then has to run the risk of spoiling his job ; for being unacquainted with the varnish—and all varnishes manufactured by different makers have their respective peculiarities—he goes at the work with more or less nervousness and hesitancy, and is almost certain to turn out a poor job.

Always "let well enough alone," if you have good varnish and know how to use it ; let the new man, with his new varnish, negotiate with some *new* shop, where *new* work is done, by *new* hands.

I do not wish to be understood as taking a stand against improvement, but as a general thing, there are too many changes with regard to varnish made in many shops. Neither would I speak disparagingly of varnish manufacturers, but would give all a fair show. Let

those, however, who prefer one maker's goods patronize him. "Each one to his taste." I echo the sentiments of a score of painters, and should not be judged harshly therefor.

I have a preference for varnishes, and will without fear or favor state that in the twenty years' experience which I have had, I have never used varnish on which I could place so much reliance as that made by Smith, Baldwin & Co. This is no advertisement paragraph, but the honest conviction of the author, and should there be those in the fraternity dissatisfied with the varnish which they have been using, I ask them to prove for themselves my words.

There are different opinions existing as regards the necessary qualities of varnishes—some preferring a quick-setting varnish, and others, a slow-setting one to enable them to "lay off" well; consequently each must try for himself. The rubbing varnish made by the house just mentioned dries hard and quickly,

leaving an excellent surface to rub on; while their finishing varnish has a brilliant gloss, and can be laid on as easily as one could desire.

Messrs S. B. & Co.'s coloring varnish I have already mentioned, though, I repeat, that I have never seen its equal.

In re-varnishing old work it is not well to put English on the old surface, it being apt to "crawl" or "pit," therefore I invariably use the above American varnish first, and finish with Wearing English.

A newly finished job should always be washed with clear cold water, and dried with a clean shammy, before allowing it to leave the paint shop; this hardens the surface and prevents the dust from sticking to it.

If varnish is found to "crawl," wipe the surface with a damp shammy. Never dilute varnish with turpentine, as it kills the gloss. If too thick, warm it by the stove or place the cup on a warm iron.

POLISHING.

POLISHING on carriages is now among the things of the past; but to describe the method will not be amiss, perhaps.

Finish your job as smoothly and cleanly as possible with American finishing varnish, and let it stand at least ten days; then rub down with pumice-stone the same as if a rubbing coat; clean off, and rub again with rotten stone ground fine, until the marks of the pumice-stone are all obliterated; next rub with rotten stone and oil until a gloss appears. Then substitute Spanish whiting for the rotten stone; this should be washed, *i. e.:*

Mix the whiting in a pail of water, until like milk: let it settle a moment to get the stones, dirt or lumps out; pour off the milky liquid into a clean pan, and let it settle thoroughly: pour off the clear water and dry the sediment; it will be an impalpable powder, and mixed with the sweet oil will produce a good polish on the

panel. Clean all off with soft silk, and you have a glossy surface, superior to varnish in point of wear—but not in looks.

Fancy boxes may be polished in this way, and are better than varnished surfaces. Furniture, pianos and fancy articles are generally polished, and there are preparations to be had at furniture stores for re-polishing, which answer a very good purpose.

PAINTING COACHES, ETC.

THE *modus operandi* of painting heavy jobs differs but little in the foundation coats from light work: therefore I will not enter into details with regard to it. The workman must be more particular with this work, but one who can paint a buggy *well* should be able to get up a good job on heavy work. Confidence in your abilities is one half the battle.

The panels of such work are generally painted in colors, while the pillars, top-strip, quarters,

deck, etc., are always black. Umber colors, lakes, greens, and blues are some of the best colors used on this work. To prepare the body for any of these colors, we should use a *ground* color in the place of lampblack on black work.

The following are a few of the *grounds* most approved.

LAKE.—Indian red and vermilion mixed to a dark brown, though some prefer a black ground for lake.

Lake should never be mixed to dry 'dead,' but with a subdued appearance, by putting in varnish enough. The best way is to try it on a board before laying on. If "dead," it loses one-half its brilliancy, and will be apt to be cloudy.

ULTRAMARINE.—Mix a medium blue with keg lead and Prussian blue.

VERMILION.—A light pink color is generally used as a ground for vermilion, but if a pure white ground is gotten up from the beginning,

you will find the color to cover well, and lose none of its pristine beauty. Don't forget to put flower of sulphur into your vermilion, as spoken of on page 26, to preserve the color.

GREEN.—Green and all heavy-bodied colors will cover well on the lead color without any ground color.

TO PAINT PANELS CARMINE.

To make a good job with carmine, we should get up an English vermilion ground, into coloring varnish, well rubbed down with pumice stone ; for we cannot rub a great deal after the job is glazed. Some painters mix their carmine glazing with rubbing varnish and oil, but you will find such jobs frequently "spotted ;" the best way is to mix in English varnish, adding a little gold size for a dryer ; this flows evenly and does not cloud or spot if properly put on. When a job is glazed, rub it carefully and apply a coat of American finish-

ing and rubbing, mixed in equal parts. This can be rubbed for finishing coats, whereas if rubbing varnish be put on over the glazing it might crack,—but the mixture will stand the wear of years.

Ultramarine blue panels can be made the same way, the ground being gotten up with Prussian blue.

A beautiful wine color or lake may be made by glazing Indian red or brown with carmine.

A brilliant green may be produced by a light pea green glazed with verdigris or with Paris green.

Striping may be glazed in the same manner, but of course on dead striping color.

Some painters put on glazing the same as, and in the place of coloring varnish. I think this a very poor plan, as you have no chance to rub the surface until there is so much varnish over it, that the color is injured.

The workman by experiment can discover many splendid variations of shades and tints

by the glazing process, and his labors will be better rewarded by knowledge acquired in that manner than if I were to extend this article to greater length with more precepts.

STRIPING.

WHEN tube colors are used for striping, there will be no trouble experienced in mixing, as they only require thinning with turpentine, and the addition of a little sugar of lead. We must use our own taste in striping; though governed a little by prevailing styles. It would be folly for me to dictate any particular style. The manner in which striping is done can be learned in three minutes by looking at a workman while at work, but long experience is required to perform the operation well; suffice it then for me to say, get good tools and colors and *practice* on a wheel or board painted for the purpose,

until you can master the art, for only practice, patience and perseverance *can* accomplish it.

When striping on solid color, the ends of the stripes or any imperfections can be "cut off" or improved with a little of the "dead" color, but on a glazed or light color the "cutting off" would show, therefore, when thus employed on these colors we have a little oil ready, and before the stripes are dry, we draw a pencil filled with the oil across the ends. Then the stripes will dry everywhere but in those places where the oil is, and then they can be washed off with soap and water after all the rest is dry—and thus leave the stripes with a square end. Bronze striping is fashionable, while glazed stripes are always considered beautiful. (See Bronzing and Gilding.)

Striping with a mathematical or drawing pen will be found excellent on panels or sleighs.

Scotch plaid work is now out of fashion, as

well as cane work, or raised cane. The latter "raised Cain" with many who did not know its secret, and although an extended article could be written on that kind of work alone, and would be considered interesting by some, its antiquity will not warrant more than this brief notice.

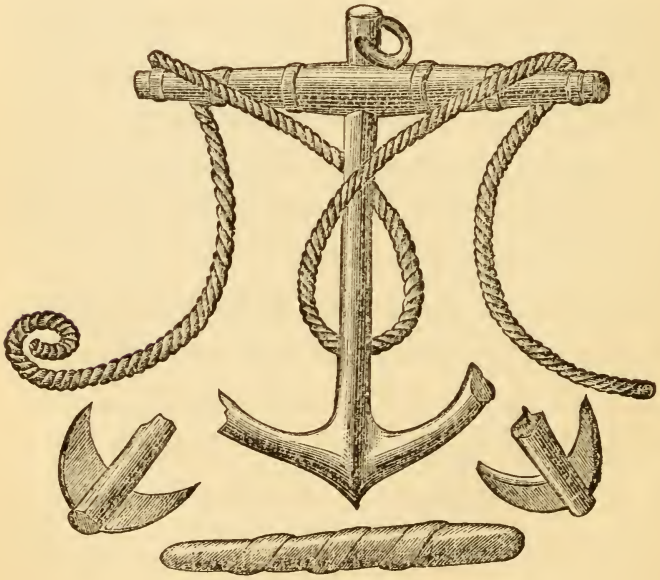
ORNAMENTING.

THIS art requires practice, and the ornamenter should be able to draw well. However there will be found in these pages rules for copying, by which a medium workman may execute fine ornamental work, with but little knowledge of drawing.

Monograms being more fashionable and by far more appropriate for this country than Coats of Arms, I will endeavor to aid the workman in executing these "tangled up" letters. The letters of monograms are not confined to any particular style or size, yet

there is a peculiarity about them not found in other places. I show on another page letters suitable for monograms ; the workman, to twist them up, will copy them (as shown hereafter), and laying the two or three letters, as desired, against the window, can "lay them out" to suit his taste.

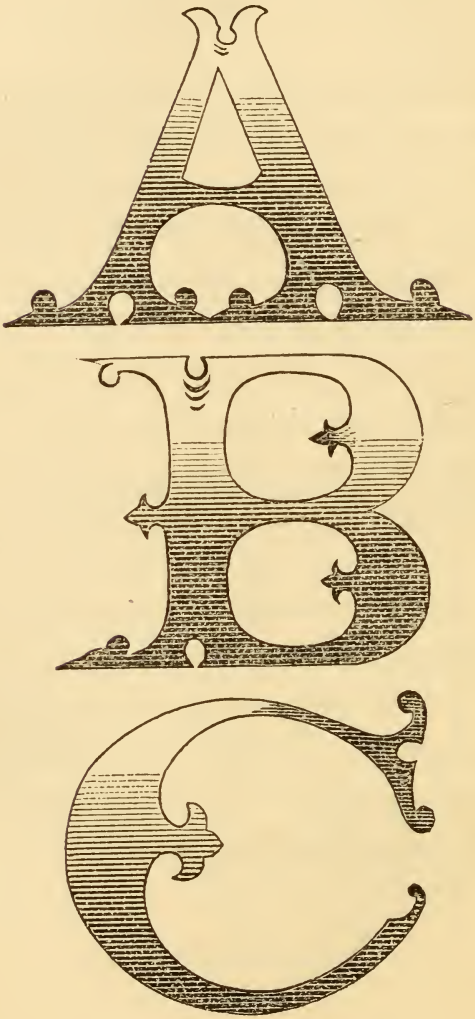
It may be necessary to make some letters larger, as seen in the monogram of the author



on the frontispiece. This, a little practice will render easy.

The form of monograms may be sometimes made to represent the vocation or business of the owner, as shown in the accompanying engraving. The initials are T. M., made with a broken anchor and a rope, while the flukes, or broken parts of the anchor, form the ground. This monogram may represent Thomas Moore, a sea captain, or sailor. Such ornaments are generally expensive, if the services of an artist are called into requisition.

The "prominent letter" is generally the one covering the greatest part of the outside space, or, to define it more clearly, in a monogram composed of H. D. C., the C, which should be the "prominent letter," is made largest and almost encircles the whole monogram.



GILDING.

THIS beautiful art requires our special attention, for it appears to many to be a very troublesome operation to execute well. But it is easily done, as my remarks will show, and a little experience prove. It is best when gilding on carriage or wagon work, where the gold will be protected with varnish, to procure "gold size" ready prepared—English gold size being the best. If not to be had, you can make a substitute by using English varnish and Japan in equal parts. If the gilding is for striping, you should mix a little chrome yellow with it, to be able to see the lines better; but in lettering no coloring is required. Having your job rubbed down smoothly, take a piece of muslin and tie up in it a little whitening to form a "pounce bag;" with this you pounce or dust over every part of the work where the gold leaf is to be put, to prevent the leaf from sticking to the

surface not covered by the size. Another method is to wash the job over with starch water ; while still another plan is—where dust or starch is not applicable on account of newly varnished work near by,—to cut a potato in half, and with the raw surface rub the place desired, leaving the juice of the potato on; this soon dries and forms a thin film, to which the gold will not adhere. Any one of the above methods will be found to answer the purpose, and the coating will wash off clean when the gilding is dry. The surface prepared, take the size and put on the stripes, ornaments, or whatnot, and allow it to dry just enough to enable you to pass your finger over it without it sticking ; but if when the finger is placed directly upon it, it is "tacky," it is ready to receive the gold.

For signs, or work which is not to be covered with varnish, we should use oil size, which is made with old boiled oil. The best is that taken from a paint cup in which the

paint has settled and left the oil on top. Pour this off carefully and grind into it a little chrome yellow.

TO LAY GOLD LEAF.

IF for scrolls, letters, or large work, take the book of gold leaf in the left hand, and with the forefinger of the right hand lift the first paper leaf, leaving the gold on the opposite leaf smooth; then holding the book close to the work, with the front pointed downward toward the bottom of the letters or scroll and lightly touch it, rolling the book up and leaving the gold on the letters. Repeat this operation until all the size is covered. Touch any missed spot with the finger tipped with the superfluous gold, and wipe all off nicely with a bunch of cotton.

For striping it is better to use a "tip," (which can be found at any supply store). Place the book on a piece of board covered

with cloth, and raising the paper, cut the leaf the desired size with a table-knife, the edge of which is perfectly straight and smooth. Then draw the tip across your face or head, to slightly grease it, and lay it on the cut gold; you can then lift and carry it to the size. Thus you can proceed until the striping is completed. Some painters cut the book of gold leaf in strips, and lay the leaf directly from the strips: practice with either method, and you will find it easy enough.

Gold may be shaded with transparent colors, such as asphaltum, ultramarine, lake, carmine, verdigris, Paris green, etc., to suit the taste of the painter.

BRONZING.

GOLD BRONZE is used on carriage parts for striping; and many fine fancy jobs can be done with this powder.

The size used for bronze is the same as that described for gold leaf.

To put on the bronze,—take a piece of plush or velvet, and make a small "pounce" bag, by tying up a ball of cotton. This will take up the bronze, which is gently rubbed over the size. The best quality of bronze is but little inferior to gold leaf, and for striping is better, as it does not consume so much time, and at the same time it is cheaper than gold leaf. To make fancy work with bronze, cut out any desired pattern in paper, and laying it over a nearly dry varnished surface, rub the bronze on through the holes of the pattern. The fronts of the spokes and the ribs of express wagons may be nicely ornamented in this manner.

Copper and silver bronze can also be used in this way, and when the three are mixed up in ornaments they look well.

TO PAINT A BUSINESS WAGON.

IN painting a business wagon we do not in all cases rough-stuff the bodies, as it would be too expensive and troublesome; therefore we must get up the surface with lead and sandpaper. We use the same paint as used on carriages, sandpapering, puttying, etc., between each coat. Facing lead will be found excellent for the last coat of lead, as it cuts smoothly and easily with No. 1½ sandpaper.

The colors of business wagons are generally decided by the owner, but I will add hereto a few of the colors which look well together.

No. 1.

BODY.—Chrome green: frame or ribs, black, striped with white or cream color.

RUNNING GEAR.—Cream color, striped with red, blue or dark green or black, and red fine line.

No. 2.

BODY.—Yellow: frame black, striped with white or blue.

RUNNING GEAR.—Light vermilion, striped with black and white.

No. 3.

BODY.—Carmine glaze over Indian red.

RUNNING GEAR.—Vermilion.

No. 4.

BODY.—Deep vermilion.

RUNNING GEAR.—Light vermilion.

SLEIGHS.

THERE is so much variety in the styles and colors of this class of work, that I dare not say much in regard to it. The foundation is the same as for buggies. Glazed colors are the most frequently used. Ornamental work,

such as scrolls, birds, vines and flowers, are in good taste, and if well done, add to the price. Gold striping worked up with fine lines of colors are in great demand—and it seems almost impossible to get on too much fancy work. The sleigh is presumed to form a part and parcel of the joy and mirth of a sleigh-ride. The following lines being *apropos* here, I venture to add them:

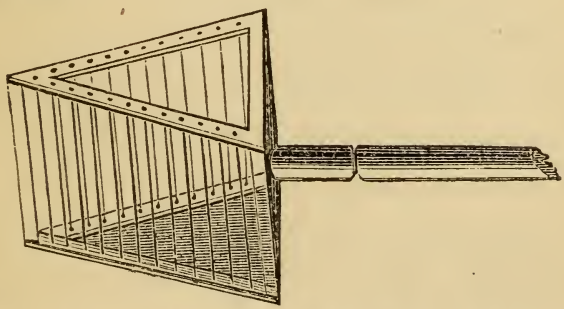
"The snow, the snow, the fleecy snow,
And the bells so full of glee,
Bring out the bay and the dapple gray,
And a sleighing go with me.

For it's jingle, jingle, jing;
Let the sleigh-bells ring.

"As swiftly we glide along;
Our hearts keep time
To the merry chime,
While our voices swell the song."

TO REMOVE OLD PAINT.

THERE are various methods employed for removing old paint, and I will endeavor to describe them. First there is the hot-iron process. This is done by taking a heavy piece of iron and heating it in a stove or forge, and then holding it close to the work. The paint will blister or soften, and can be scraped off with a putty knife or chisel. A better plan is the furnace process. The furnace is made of sheet-iron and heavy wire ; its general form is shown in the accompanying engraving.



The triangular shape allows it to be held closely to the work on either side. Being

filled with ignited charcoal, and a good fire kept up by holding it in a draft, frequently, one can with this "burn off" a body very quickly and well.

There is also a patent lamp used for the purpose. I have used one, and found it an excellent tool. It is designed to burn alcohol, and makes at the same time alcoholic gas, which is directed upon the flame by a pipe, while the flame is blown out in a long tongue of fire. This lamp is self-acting, and the workman merely holds the lamp in his left-hand, directing the tongue of flame upon the desired spot, scraping the paint off as he goes along with the right hand.

Still another process is the potash plan. Dissolve one pound of potash in three pints of water over the fire, then add yellow ochre or some common dry paint until it is as thick as rough stuff. Smear this over the panel with an old brush, and in a little while you can scrape off the paint like old cheese. Some

years ago I was induced to use a preparation (Ostrander's) to take the place of potash—but it was a failure. After the paint is taken off by the potash process, wash the wood well with soap and water to remove any residual potash, dry off and sandpaper, and then give a coat of clean raw oil.

With the furnace or hot iron process, sandpaper smoothly and apply a coat of the usual priming, and proceed as if on new work.

Carriage parts must be scraped, and for this purpose I use a tool, as shown in the engraving. It is made of steel (an old file for instance), the square centre part being ground, and the four square edges are excellent to scrape the spokes, while the ends will be found useful on the carriage part. It is only where an extra job is wanted that it will be necessary to scrape off the carriage part,

for we can generally fill them up with lead and get a good substantial surface.

RE-VARNISHING.

OLD jobs should be rubbed well with pumice stone and water, the bare wood being covered with lead color (No. 1). All spots not *bare* can be touched up with dead color; then put on a coat of rubbing varnish. If there be spots yet not colored properly, they can be fixed for the next or finishing coat. It is generally the cheapest plan to color the carriage part over and stripe anew, as it is a long, tedious job to touch it up, and never looks well.

AN EASY WAY TO CLEAN THE MILL.

WHEN the paint is all out of the mill, it is best to clean the same, before the grinding surfaces become gummed up with dried color. The easiest way is to have a box of sawdust,

in which the parts of the mill may be placed and rubbed clean.

TO BIND A BRUSH.

BRUSHES, when new, should be bound at least one-third the length of the hair, to preserve them and render them better for use. Some painters bind a strong cord round and round to the proper distance, and secure each end to the handle.

But a better way is, to take a piece of strong muslin and wrap one thickness around the hair, then tie a cord firmly around the same as low as you desire the binding to come: then fold the muslin back toward the handle, and fasten it by tacking the margin around the border of the original binding.

This method makes a very neat binding especially for varnish brushes.

BLEACHING OIL.

POUR about as much linseed oil into a shallow earthen vessel as will stand one inch in depth; then pour in six inches of water, cover with a fine cloth, and let the whole stand in the sun for a few weeks until the liquid becomes thick, when it should be poured in a phial and submitted to a gentle heat, after which the clear is to be poured off and strained through a flannel cloth.

ABOUT OILS.

THE longer oil is kept, it is always the better both in regard to its drying and transparent qualities. To make good nut oil, the skins of ripe walnuts should be peeled off, as it contains an acid which turns it brown. Poppy oil is made from the ripe seed of poppies. It is the best drying oil. The oil of spike, or lavender, is obtained by distilling

spike with water; it is very volatile and fine for working with the pencil, or for enamelling. To make a fine drying oil for extra fine painting, take of poppy oil or nut oil one pint, of gum sandarac two ounces, of white vitriol and sugar of lead, each one ounce. Boil the whole till the solid ingredients are dissolved, and the mixture is the color of linseed oil.

This oil will dry fast, and a portion of pure turpentine added makes a fine oil for use where the purest white tint is required. It may be mixed with other oils as a drying, where common drying oil would be injurious to the color.

Raw linseed oil for carriage work is best, as being more volatile than boiled oil, it strikes into the wood, and forms a hard, resinous filling.

TO TRANSFER A PICTURE.

PICTURES are frequently transferred to painted surfaces or wood, and may be seen on

stages, fancy boxes, etc. To transfer a picture, prepare a white ground well rubbed down with pumice stone and water. Then apply a thin coat of very light-colored varnish. (English hard drying is good.) When this is not quite dry—"tacky," like gold size—dampen the picture on the back with clean water, and lay it between some newspapers to remove any water that might be on the face of the picture; then lay it carefully on the varnished surface, pressing it down with a damp cloth, or the finger, until there are no bubbles or air underneath; if there should be bubbles not easily pressed out, prick them with a pin to let the air escape. Then stand the work aside to dry, and when hard, dampen the paper, and it can be rolled off by the finger in small rolls, until the picture is left quite perfect on the paint. After this has dried well, a coat of clear light varnish will finish the operation. The same process is used to transfer pictures to glass, and when colored on the back they look

beautifully. Almost any one can do this kind of ornamentation nicely. Try it on a small scale.

Another method is to use Grecian varnish—Canada balsam and turpentine—but Copal varnish is better where you desire durability; and, besides, every carriage painter has the material always at hand.

VARNISH FOR MAPS AND PICTURES.

A GOOD varnish for maps and pictures is made of Canada balsam and rectified oil of turpentine in equal parts, mixed. Set the bottle containing the mixture in warm water and agitate until the solution is perfect; then set in a warm place a week to settle, and when settled pour off the clear varnish for use.

ANOTHER.

TAKE two ounces of gum mastic and one ounce of gum sandarac, reduce them to a powder, then put them in a flask or bottle and add a pint of alcohol; shake the whole together till the gums have dissolved, strain the solution through a fine flannel, and put it in a clean bottle, corked tight, till wanted for use. This varnish will dry in one minute, and on fancy boxes, pictures, etc., will form a good water-proof coating.

TO PRESERVE PENCIL DRAWINGS.

WASH lead-pencil drawings, such as patterns, etc., with gun cotton in ether, (collodion,) and you will firmly fix them so that rubber will not rub them out.

TO COPY AN ORNAMENT FROM PAPER.

PLACE the paper containing the ornament against a window pane, and then laying a sheet

of thin paper over it you can copy it exactly with a lead pencil.

COPYING PAPER.

MIX six parts by weight of turpentine, one part of rosin, and one part of boiled nut oil, and apply to the paper with a sponge. A small quantity of plumbago (black lead) added to the mixture makes a very good paper to lay under an ornament which you wish to transfer.

TRACING PAPER.

TAKE thin tissue paper and apply a coat of varnish, and when dry you can trace any ornament you wish with a pencil upon it. When an ornament has been traced upon this paper, rub over the back some dry color, and then by laying it on the place you desire to paint, you can follow the lines with a pencil, and you will find the counterpart on the

panel; then lightly scratch these lines with a pin, and wipe off the dry color.

TO PRESERVE ORNAMENTS.

ORNAMENTS on work to be repainted may be saved, if the paint is not to be burnt off, by taking a little glue and whiting, while warm, and applying a thin coat with an ornamenting pencil. This will soon dry, when another coat should be put on, and you can then paint over the ornament, being careful not to touch the spot with sandpaper or pumice stone and water until the job is ready to rub down in coloring varnish, when the glue can be soaked off clean. There will be found a slight depression from the surface, but this can be remedied by giving the ornament a thick coat of rubbing varnish with the pencil; and when the succeeding coats of varnish are rubbed down it will be found level.

LETTERING.

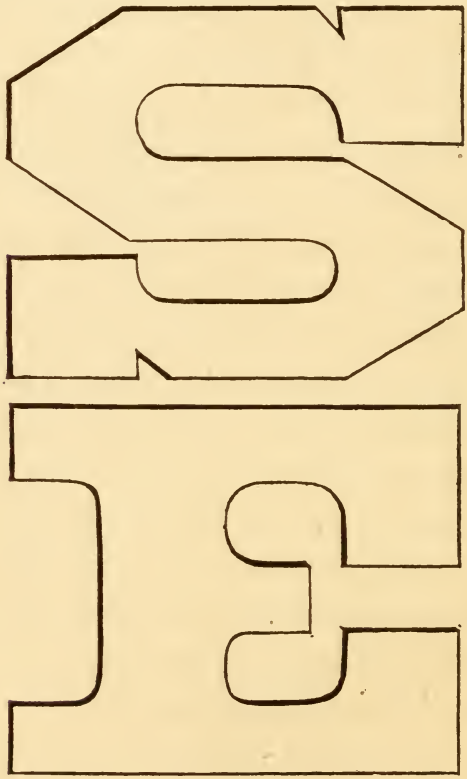
THERE is a vast difference between the lettering of wagons and that of signs; therefore it becomes my duty to lay before the readers of this book the peculiarities attending this beautiful and useful art.

The principle aimed at in wagon lettering is plain, or ornamentally arranged letters, which may be seen and easily read while the wagon is in *motion;* while signs are expected to be read while the reader is moving. A solid bodied letter therefore is necessary for wagon work, as that can be seen and read at a greater distance than a Roman letter, or one having fine lines.

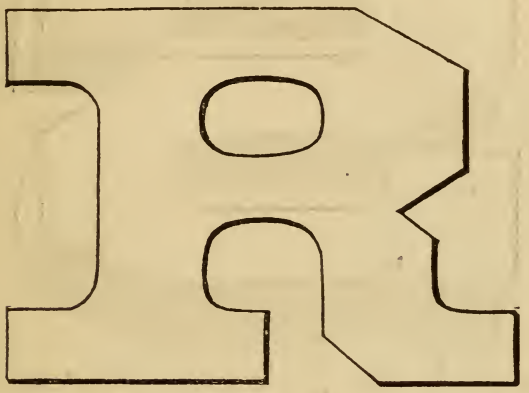
There are several varieties of letters used in wagon lettering, but the principal styles, and those most frequently used, will be shown in these pages. There is a difference in outline from printers' type, and consequently it is not always best to follow after or copy *print,* when

making letters. The names of the principal styles of letters are :

Octagon Full Block, Round Full Block, Octagon Half Block, Round Half Block, Antique Block, Roman, Italic, Italian Back

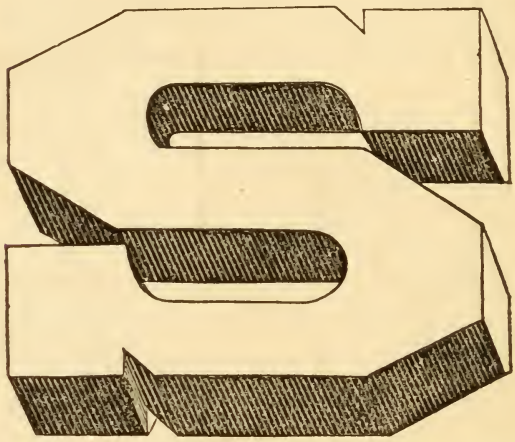


slope, Front slope, *Capitals and Lower-case*. The latter names are taken from the printers, and mean the capitals or large letters, and the lower case, or the small ones of same style.

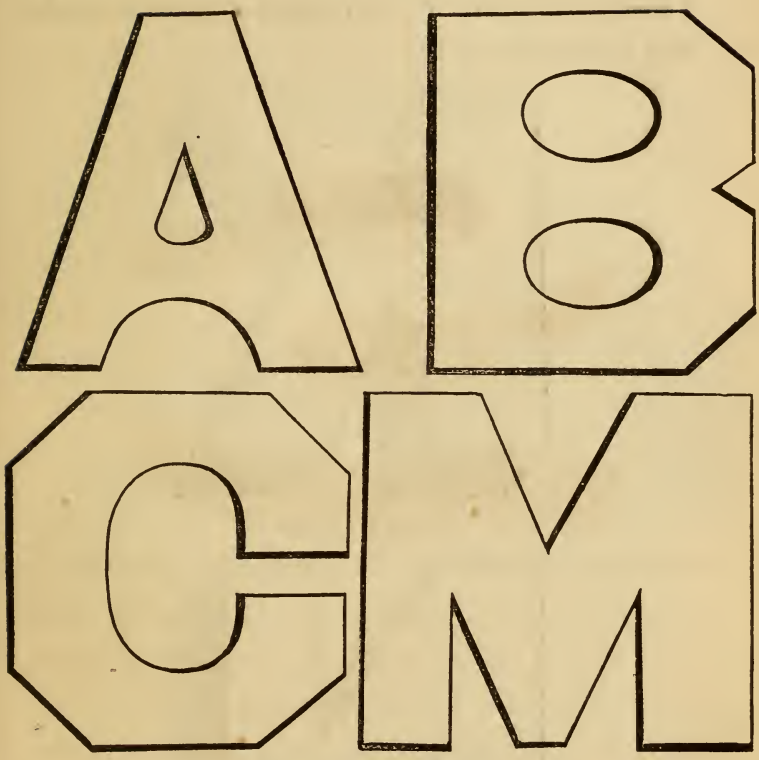


The first style shown is Octagon Full Block, which is a beautiful letter on almost any kind of work, and it can be greatly extended if desired to fill a certain space. When shaded nicely this style presents a bold front, and can be read distinctly at a considerable distance. The letter S shown on page 82 represents a *block shade*, which may be executed very easily by glazing the dark shade; as, for instance,

the letter having been shaded with vermilion, the dark shaded part is glazed with car-



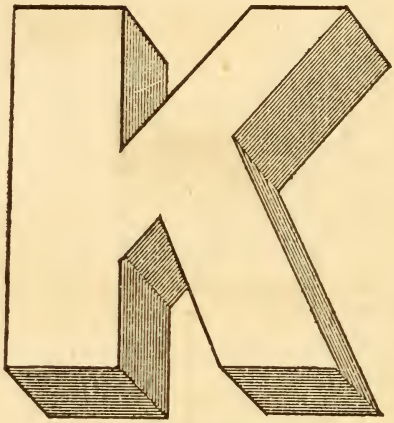
mine, and the light part left vermilion. Another very good way by which you can make three shades, or what is termed "Double shade blocked" is to shade the letter with light blue, block shade with medium blue, and then double shade with ultramarine blue. The next letter in order is the Round full block; these are similar to the Octagon, with the exception that the corners are rounded.



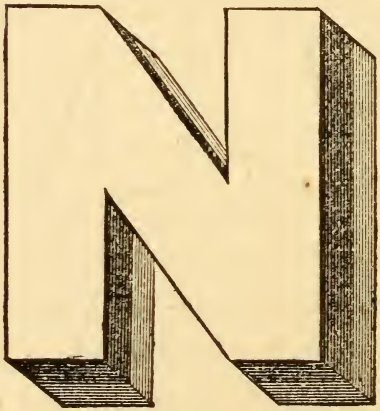
OCTAGON HALF BLOCK.

This is a very easy letter to draw and paint, and when shaded nicely, has a very neat appearance. It may be condensed or extended to suit the taste of the letterer, and where *speed* is desired in lettering, this style will be found

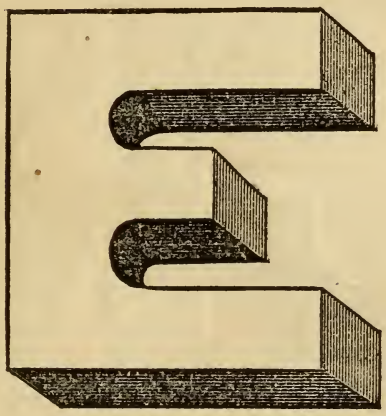
to answer well. I show three styles of shade-ing herewith.



SINGLE SHADE.



DOUBLE SHADE.

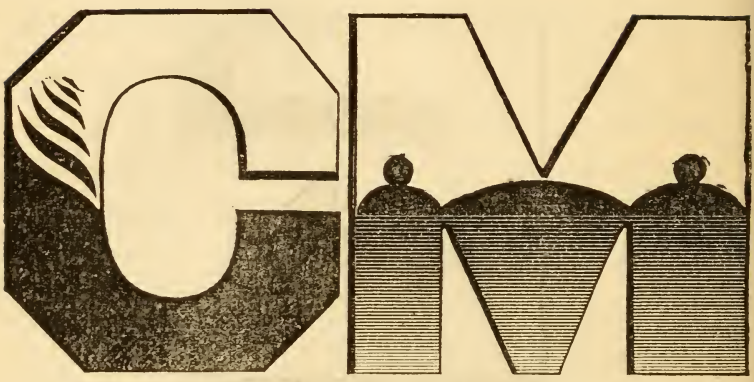


BLOCK SHADE.

This style of letter, when in gold, and "edged all around"—as hereafter described,—will be found excellent for the fronts of trucks, panels of express wagons, and as a feature of variety on top-sides.

Such letters may be ornamented when desired, as shown in the engraving, the letter being made with a light color, say, light blue, and then the dark blue put on, as already mentioned. This makes a splendid line of letters, and is very fashionable.

The style of letters used is generally decided



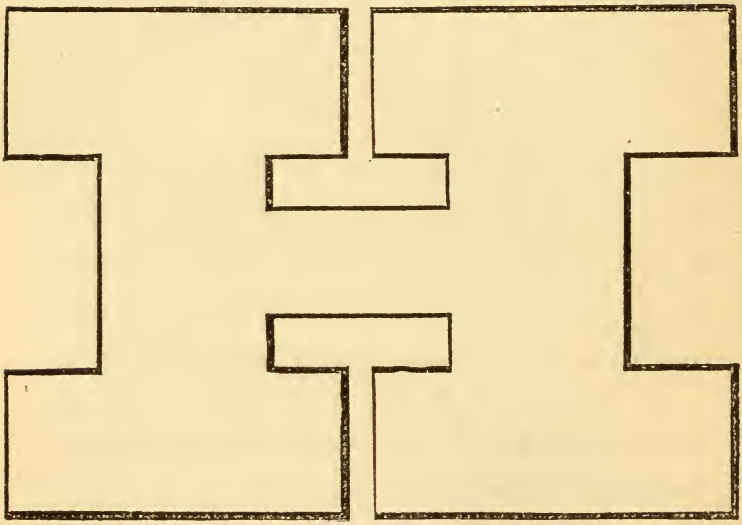
by the length of *space,* and the number of letters desired in that space. No two lines of the same style should be placed together, if possible to prevent it, but an alternate use of one style will not look out of place, if a difference be made in shading. Sometimes it is necessary to use a certain style of letter, even if that style has to be condensed or extended to fill the space; but this must be determined by the workman, and experience will teach the requisite good taste.

To lay out a line of letters, decide upon the size, then draw a line for the top and another for the bottom; then with a pair of dividers

set to a chosen size, run over the length of space to see if you will have room enough to put in the desired number of letters ; if not, set the dividers again and measure the space again. Bear in mind that the space between letters is *not* always the same, for where such letters as A. F. J. L. T. V. W. Y. are used, the space between them and the other letters is but one-half that which is left between letters like H. D. B., etc. An L. placed next to a V., with the same space as given to H. B., would look very badly, owing to the open character of the L. The letter I. should have considerable space, that it be not confused with the other letters. The arrangement of letters can be well studied by paying close attention to the work of some good letterer ; and as it is a difficult task to describe fully the "laying out" without numerous diagrams, I will "rest here," on that point, as a lawyer would say.

The Antique block letter will be found

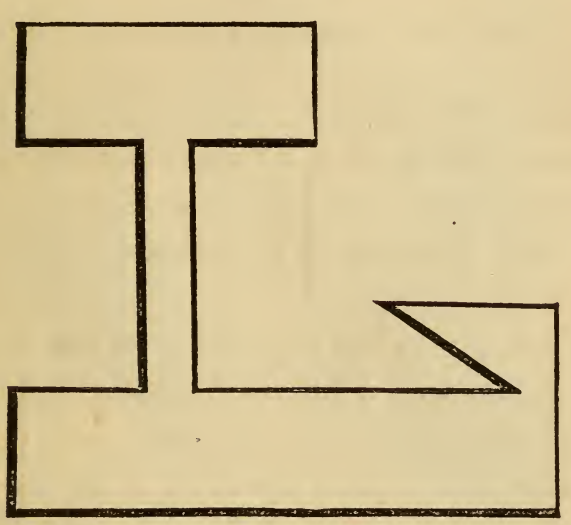
very useful as well as the Italian, both of which are used extensively on milk-wagons in our city.



ANTIQUE BLOCK LETTER.

Wagon lettering is invariably shaded on the right side, a rule which custom has created among first-class wagon letterers, leaving sign work to be shaded on the *left side*, as you will notice is more frequently done.

Gold lettering on any ground color should always be shaded and "edged," the latter



ITALIAN BLOCK LETTER.

being a fine white or cream-colored line on the edge of the letter, opposite the shade; or it may be put all around the letter and still be in good taste. Gold letters on a red ground are generally shaded with black and double shaded with carmine or asphaltum, edged with white. Gold on a white ground is edged with black.

SCROLLS.

THIS work requires the good taste and perfect outline of a draughtsman. But an insight into this art may be gained by copying the work of others, by processes described in this book.

When a copy has been made on the copying paper, take a piece of stout wrapping-paper, and laying it on a smooth board, place the copy over it, and fasten all down to the board with a few tacks or pins ; then with a pin prick the outlines with small holes through the copy and wrapping-paper. Having done this, lift all from the board, and by placing the wrapping-paper copy on the panel, and dusting on fine whiting with a pounce-bag, you will transfer the copy to the panel. Next proceed to fill in the outlines with gold size ; lay on the gold, and then clean all off nicely for shading.

This is done with asphaltum, but a very

fine effect can be made by glazing some parts with carmine or blue. Copy the shading of the original as near as possible ; put in the lights or white fine lines, and with a little practice and the use of pattern, you will soon gain a knowledge of scrolling sufficient to enable you to perform ordinary work.

Scrolling in colors can be learned in the same way, but it is a more difficult art, as it requires good taste in the application of colors—harmony of colors being the greatest desideratum in good scrolling.

STENCILING.

STENCILING is an art by which the painter can execute ornamental work quickly, and when thoroughly understood it will often be called into requisition in the wagon paint shop.

The articles required in making a stencil,

are a sheet of well-sized writing paper, a lead pencil, and a sharp penknife.

Fold the paper, allowing the edge of the

fold to form the centre of the pattern ; then draw any design you wish, leaving bars to hold the parts together, as seen in the engraving herewith ; then lay the paper upon a piece of glass and cut out the figure with the penknife.

Fac simile copies of these engravings may be made by copying, (as already described,) and they will be found useful on the panels, springs, bars and spokes of a wagon. Figs. 1 and 2 are illustrations of neat and simple patterns in stenciling, and such as may be used for the ends of small panels, or parts of the figures on springs, etc.

The tool used for this work is a camels'-hair brush or pencil, with hair not over one-half an inch long, bound with quill and wire on a round wooden handle. Price at supply stores, rates from 25 cents to $1.00. The small sizes are preferable.

The color may be mixed in Japan and turpentine, as for striping, but color mixed

with vinegar and sugar will be found best. The paint must be quite thick, and a small quantity only must be taken on the brush, and then well rubbed out on a dry place before applying it to the work.

Laying the stencil on the panel as desired, hold it down firmly, and rub over with the brush carefully until the cut portions of the figure are well coated. Then lift off the stencil and the work is completed.

Many of my readers may have noticed the beautiful work executed by fresco painters, and wondered how it was done so correctly ; and now with the ideas here shown, the ordinary painter may compete with that class of workmen in the ornamentation of his special line, combining beauty, economy and dispatch.

TO TRANSFER ORNAMENTS FOR CARRIAGES, WAGONS, ETC.

THIS beautiful art is now practiced by many painters, who are either in a hurry with their work, or for economy's sake.

Pictures expressly designed for carriages are now sold at the leading periodical stores, and the amateur painter is enabled thereby to finish a job of carriage painting in fine style.

These pictures may be stuck on, and the dampened paper carefully removed, leaving the picture intact upon the panel, requiring no touching with the pencil. The proper way to put on decalcomine pictures is to varnish the picture carefully with the prepared varnish (which can be obtained with the pictures,) with an ornamenting pencil, being sure not to get the varnish on the white paper. In a few minutes the picture will be ready to lay on the panel, and the paper can be removed by wetting it, as already described ;

and when thoroughly dry it should be varnished like an oil painting. Be particular to purchase none of these transfer pictures, except those covered with gold leaf on the back, for they will show plainly on any colored surface, while the plain pictures are used *only* on white or light grounds. They may be procured at any stationery store, and the cost is trifling.

STAINING WOOD.

TAKE nitric acid and dilute with ten parts water, wash the wood with it, and a mahogany color will be obtained.

To produce a rosewood finish, glaze the same with carmine or Munich lake.

Asphaltum, thinned with turpentine, is another excellent mahogany color, on new wood.

APPENDIX.

THE following pages I will devote to items of interest, and should there be anything left "out in the cold," I beg the reader's pardon.

To keep striping pencils in good shape and ever ready for use, grease them with tallow from a candle, and spread the hair straight on a piece of glass, keeping the same in a box made for the purpose, so that they may be preserved from dust.

Why do striping pencils curl up or "crinkle" when used in white (keg-lead) color? Because the acid with which the lead is made acts on the hair, heating and contracting the fibre. To straighten them when thus crooked, I

draw the pencil across or between a warm iron and the finger. Dry white lead mixed in varnish and turpentine is preferable for striping, but tube colors are best.

When it is desirable to glaze a job with carmine, why do you advise the workman to get up a coloring varnish surface, while some painters are in the habit of putting on glazing the same as if it were coloring varnish? Because I have then a chance to rub the job smooth, which I could not do so well *over* the glazing. Besides, the glazing being mixed with flowing varnish, will flow level and free from clouds, if put on a smooth surface.

PAPER CUPS FOR STRIPING COLORS.

ALTHOUGH I do not recommend the use of paper cups for holding striping colors, I am aware that many prefer them, as they are

easily disposed of when no longer desired for use.

The economical painter would have small tin cups to use for striping colors, as the paper cups cause a waste of sandpaper.

BRONZE PAINT FOR IRON.

IVORY black one ounce, chrome yellow one ounce, chrome green two pounds; mix with raw linseed oil, adding a little Japan to dry it, and you have a very nice bronze green. If desired, gold bronze may be put on the prominent parts, as on the tips or edges of an iron railing, when the paint is *not* quite dry, using a piece of velvet or plush with which to rub on the bronze.

TO BRONZE STATUARY.

PLASTER casts or castings may be bronzed as follows: Wash the plaster over with thin glue

or starch water. When dry apply the bronze mixture above described, adding to it a little gold bronze powder, or some Dutch metal, powdered on the stone.

TO PAINT MAGIC LANTERN SLIDES.

TRANSPARENT colors only are used for this work, such as lakes, sap-green, ultramarine, verdigris, gamboge, asphaltum, etc., mixed in oil and tempered with light-colored varnish, (white Demar).

Draw on paper the design desired, and stick it to the glass with water or gum ; then with a fine pencil put the outlines on the opposite side of the glass with the proper colors ; then fill up and shade with black or Vandyke brown, as you find best.

VARNISH FOR VIOLINS.

HEAT together at a low temperature two quarts of alcohol, half a pint of turpentine-

varnish, and one pound of clean gum mastic. When the latter is thoroughly dissolved, strain through a fine cloth.

ANOTHER.

DISSOLVE gum-shellac in alcohol by a gentle heat, and strain for use. This varnish will dry in a few minutes, and is best on account of there being no *oil* in its composition, oil being detrimental to musical instruments like the violin.

ANOTHER.

GUM mastic dissolved in spirits of wine.

TO STAIN VIOLINS.

TAKE one pound of Brazil wood and boil it in a half-gallon of water, an hour; strain the liquor and add one half an ounce of

cochineal; boil again gently, and it will be ready for use. This will produce a crimson tint. If you wish it darker, boil a small quantity of saffron in a quart of water, and apply it before putting on the crimson stain. If you desire a purple color, boil one pound of logwood in three quarts of water, then add four ounces of pearlash and two ounces of powdered indigo.

LETTERING ON GLASS.

SIGN painting on glass is one of the beautiful branches of our art, and as there are but few who can make a good job, I will endeavor to explain the method which has always been found to answer the purpose admirably.

The glass should first be thoroughly cleaned and dried, then lay out the lines for the letters with soap, a piece of hard scented soap being best, then proceed to paint the letters on the *right* side of the glass with lampblack mixed with oil—this is to form a guide for the work;

then on the inside, lay on a thin coat of size—made with the white of an egg and water; or isinglass dissolved in water—with a camels'-hair brush, covering over the whole line of letters. Then lay on the gold leaf with a tip, until every part of the letters is covered well. Allow the leaf to remain until the size is dry, and you will find that the letters on the front side can be easily seen and traced. This is done with quick drying black, to which is added a little varnish. Paint over every part of the letter directly on the gold and allow it to dry; then wipe off with soap and water the lampblack letters from the front side, and with clean cold water and a soft sponge, wash the superfluous gold leaf and size from the back, and you will have a perfect gold letter on the glass.

Proceed now to shade the letters, which may be done in colors to suit the taste of the painter. Always shade to the edge of the gold, for by that means you have only *one*

edge to make straight. The shade may be left *rough* on its extreme edge, and when dry a neat straight edge can be obtained by merely scraping with a knife.

ORNAMENTAL DESIGNS ON GLASS.

IN making scrolls, eagles, etc., on glass, some painters put on the outlines and shades first, and then lay the gold leaf over all. Another good way is to scratch the shades into the gold leaf after it is dry, and put the colors on the back of the gold.

Silver leaf may be used in the same manner as gold, but it will not wear as well.

A very pretty letter may be made by incorporating silver with gold.

Take paper and cut any fancy design to fit the parts of the letter, stick it on to the size before laying the leaf, and then lay the leaf, allowing it to dry, and wash off as before ; then with a penknife raise the paper figure, and

the exact shape or form of the figure will be found cut out of the gold letter. Clean off nicely, apply more size, and lay *silver* leaf to cover the vacant spots. Wash off when dry, and a very handsome ornamented letter will be the result.

Colors may be used instead of silver, if desired, or a silver letter, edged or "cut up" with gold, will look well.

PERMANENT WOOD FILLING.

A PREPARATION designed to supercede the lead color filling of carriage bodies was some time ago put in the market and *tried* by almost every carriage-maker in the country; but I have yet to learn of its efficacy, outside of the windy advertisements in its favor. I can point to several large cans which have been "weighed in the balance and found wanting," as far as usefulness is concerned, which are among the refuse of the paint shop.

TO IMITATE TORTOISE-SHELL.

PAINT a ground of salmon color; then, when dry and smoothed off, coat it over with rose-pink, mixed in varnish and turpentine; then with a flat piece of glass press on the surface, and remove the glass quickly, being careful not to slip it over the paints so as to disturb the curious figures which the pressure will form thereon, after the paint has dried and been varnished, and you will find that you have made a very good imitation of the tortoise-shell.

KEEPING ENGLISH VARNISH.

I PREFER to keep English or finishing varnish cans covered with a piece of silk, which should be tied over the mouth of the can, instead of a tight cork; for the reason, that extra varnishes work better, and are not so apt to "crawl" or "pit," if allowed to be in a can from which the gases may escape. This plan

is only used on cans that are in frequent use, for if air be allowed to get to the varnish for any great length of time, it will thicken the varnish and injure it. Great care should always be taken with varnish cans, for the least dust will be found to show itself, when a large panel is varnished, and many would be at a loss to account for it. Look out for your cans!

VARNISH BRUSHES.

THERE will be but seldom any occasion to wash out a varnish brush in turpentine, where care is taken to clean the work before applying the varnish. It is injurious to the brush to put it in turpentine, therefore we should endeavor to use oil in cleaning out, rather than turpentine. The best way to clean a finishing brush, if by accident it becomes dirty, is to use it on a clean panel in rubbing varnish and oil,

wiping off the panel and repeating the operation until the brush is clean.

PAINTING ON CANVAS.

BANNER work, or painting on canvas and muslin, is a particular job, for the least misstroke will spoil the work. It is always best to lay out the letters very accurately with charcoal or crayon, and then saturate the cloth with water to render the painting easy. I find on large work that a stencil is very useful. I take a piece of tin, and laying the straight edge to the mark, brush over with a sash tool, and by that means make a very clean-edged letter. Stiff bristle pencils, called "fitches" by house-painters, are best for canvas work.

OIL-CLOTH.

WHEN it is desired to paint canvas for floors, the canvas should be saturated with glue water,

or flour paste, and allowed to dry first. Then paint it with any color desired. To put in the figures, cut out designs in stiff paper and stencil them on, in various colors.

TO IMITATE MARBLE.

IN painting to imitate white marble, get up a smooth white ground, as shown in previous pages. Then hold a lighted candle near the surface and allow the smoke to form the various shades and tints desired. This will make a very handsome imitation, and cannot be equalled with the pencil.

Black marble is made by streaking a black surface with colors, using a feather and pencil. Another plan is to get up a smooth black surface, then take the colors, yellow, green, red, white, &c., ground thick in gold size, and "streak" the surface with a stick or pencil. Allow it to dry, and apply a heavy coat of lampblack and yellow ochre, mixed like rough stuff.

When all is hard, rub down to a level surface with lump pumice-stone, varnish, and a beautiful variegated marble will be the result.

OILING OR CLEANING OLD CARRIAGE TOPS.

ENAMEL leather tops should be first washed with Castile soap and warm water, then oiled with neatsfoot oil, or sweet oil, and a coat of enamel varnish put on. The leather will look like new.

Dashes may be cleaned in the same manner, but varnish color is not very beneficial to patent leather. However, when very old and cracked, it may be colored to improve the appearance.

OLD SILVER PLAITING.

SILVERED work on carriages may be improved by the following mixture :

Take one ounce of nitrate of silver, and dissolve it in one quart of rain water. When thoroughly dissolved, throw in a few crystals of hyposulphite of soda, which will form a brown precipitate, but which will be re-dissolved if sufficient hyposulphite has been employed. A slight excess of this salt must be added. The solution thus formed may be rubbed over the parts to be silvered.

A solution of gold may be made in a similar way.

This silvering solution is not like the common silvering fluids which evaporate in a few days and leave the parts worse than before.

VALUE OF THE SLUSH TUB.

THE "slush" or scrapings of the cups in a paint shop are valuable, and should be saved. No better mixture can be had for leaky roofs. And if mixed with oil and run through the

mill, it makes excellent paint for floors or bottoms of bodies.

TRANSPARENT PAINTING ON MUSLIN WINDOW-SHADES.

THIS art is extensively practiced in painting screens and window shades. The muslin is stretched on a frame and secured by tacks, then sized with a mixture of fine flour-paste, white glue, and white bar-soap; the soap renders the muslin pliable and soft. A thin coat is applied, which is nearly invisible when dry.

A coat of pure linseed oil, diluted with spirits of turpentine, is then applied to the whole, or a part, as desired, laying it on quickly and smoothly to ensure an even transparent surface.

The colors used are, ivory black, ultramarine, Paris green, verdigris, umber, sienna, asphaltum, and all other transparent colors.

An outline of the design is drawn with a small pencil with black or umber, after which the colors may be applied, more or less diluted, as more or less transparency is desired. In general, the brightest colors should be applied first and the darker shades over them.

These colors must be laid evenly and smoothly with soft brushes, and should any part be made too dark, the best way is to scrape off with a stick before the color gets too dry. The best designs for shades consists of landscape views, and should always be designed to accommodate the form and position of the ground on which they are drawn.

Stencils will be found useful on this work, in making corners or stripes for borders.

SMALTS.

SMALTS is a finely powdered glass, or other substance, well known in supply stores, and

of various colors. It is used on signs principally. The method of use is as follows.

For a gold-lettered sign, lay out on a lead color or white surface the line of letters, and roughly size the shape of each letter with *fat oil size.* This must be allowed at least twelve hours to get tacky and ready for gilding. After the gold leaf is laid and perfectly dry, mix up (for blue smalts) Prussian blue and keg-lead with oil, adding a little dryer. Outline carefully around the letters, and fill up all the outside with the blue paint; then with a small sieve sift on the smalts—allowing the sign to lay horizontally. Cover every part with plenty of smalts, and allow it to remain in the same position until the paint is dry. Then carefully shake of the superabundant smalts and the work is completed.

FLOCKINGS.

A FINE powder from cloth is also used in the same manner, and makes a beautiful sign.

Blue or light colored smalts may be shaded upon with black color, using a stiff bristle pencil.

PEARL INLAYING, OR PAPIER MACHIE.

A VERY handsome effect is given to ornamental work by inlaying. Prepare the job with a heavy coat of black Japan ; then before it is dry, procure some flakes of pearl at the supply store, then lay them on the black surface, pressing them also into the paint until they are level with the surface ; then, with colors, form vines and flowers, allowing the pearl to form the body of the flower leaf, and shade all up nicely.

LIST OF CARRIAGE MAKERS IN NEW YORK CITY.

To aid the painter, when in search of employment, I add a list of carriage-makers, with the firm conviction that my efforts in their behalf will be fully appreciated.

Adams, Levi, 2293 Third Avenue.
Ashe, Frank, 163 Crosby Street.
Baldwin, T. E., 786 Broadway.
Barton & Boyle, 6 Seventh Avenue.
Bates, S. E., 1505 Broadway.
Beardsley & Co., 110 W. Thirty-seventh.
Becker, F., 207 Green.
Bell, Arthur, 142 E. Forty-first.
Benson, Bros., 155 E. Twenty-third.
Brewster, J. B., & Co., 65 E. Twenty-fifth.
Brewster & Co., 374 Broome.
Brown & Goodwin, 1404 Broadway.
Campbell & McPherson, 100 W. Thirty-third.
Cary, George, 128 W. Forty-sixth.
Corbett & Scharch, 126 W. Twenty-fifth.

Demarest & Woodruff, 628 Broadway.
Dubois, A. J., 202 Greene.
Dusenbury & Nelson, Jr., 98 Laurens.
Engle, Henry, 114 Elizabeth.
Flandrau, A. S., 18 E. Eighteenth.
Flandrau, Wm., 280 Ninth Avenue.
Gedney, E. M., 1413 Broadway.
Geiger, L., 198 Henry.
German, Philip, 180 Chrystie.
Glueck, Marcus, 23 Third.
Gray, W. H., 27 Wooster.
Henry, Wm., 158 E. Fifty-seventh.
Hicks, I. E., 32 Barclay.
Jager, 255 W. Thirty-first.
Johnson & Van Tassell, 58 Liberty.
Lawrence, Jno. R., 558 Broadway.
Lippe, Jos., 85 Crosby.
Lockwood, Isaac, 2343 Third Avenue.
Loos & Williams, 155 W, Nineteenth.
McCready, Jas., 437 W. Thirty-fifth.
Miller, Phil., 337 W. Fifty-second.
Miner, Stevens & Co., 113 E. Thirteenth.

Mix, Eugene, 1402 Broadway.
Mix, Isaac, 598 Broadway.
Monk, Irving, 102 Laurens.
Moore, Geo. J., 376 Bowery.
Murphy, Edward, 225 Greene.
Pitney, Jas. W., 460 Third Avenue.
Pomeroy, Jos. H., Jr., 156 Twenty-seventh.
Rose, W. H., 21 E. Twelfth.
Smith, Edward, 28 E. Twenty-ninth.
Smith, John I., 103 W. Fortieth.
Smith, Jos. L., 28 E. Twenty-ninth.
Stevenson, Thomas, 124 E. Thirty-second.
Stevens, R. M., 143 E. Thirty-first.
Sweeney, Edward, 237 E. Fortieth.
Swift, Charles, & Son, 123 W. Thirtieth.
Taylor, Josiah, 59 Cedar.
Tilton, B. W., 47 Broadway.
Tuttle, John H., 205 Pearl.
Voorhis, Jno. D., Broadway, cor. W. 58th.
Waldron, J. Q., & Bro., 46 Beekman.
Winans, W. H., 30 Clarke.
Weiser, H., 77 Greene.

Witty, Calvin, 168 Crosby.
Wood, F. R., 221 W. Nineteenth.
Wood, Bros. & Co., 740 Broadway.
Bach, F., 73 W. Thirty-third.
Bauer, John, 31 Sullivan.
Becker, Frederic, 207 Greene.
Briling, Robert, 123 Broome.
Buyer, Edward, 75 First Avenue.
Coe, Jonas L., 149 W. Twenty-eighth.
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WAGES.

To enable the workman to find the amount due him for work from one hour up to six days, I append the following tabular statement.

METHOD OF USING THE TABLE.

PLACE a finger of the left hand on the price per day, say $3.00, and a finger of the right hand, say 5 days. Then moving the right hand down and the left hand to the right, we strike the angle, and on that space we find $15.00 the exact amount for 5 days. If the amount be required for 4 hours extra time, at the same rate of wages, we examine the columns in the

table headed "Amount of Wages per hour," and find at the angle $1.20—which added to the 5 days wages make $16.20. This is a very easy method, when once understood.

Rate of Wages, or Price Per Day.	AMOUNT OF WAGES PER HOUR.									AMOUNT OF WAGES PER DAY, OF TEN HOURS.							
	One hour	Two hours	Three hours	Four hours	Five hours	Six hours	Seven hours	Eight hours	Nine hours	¼ day	½ day	¾ day	Two days	Three days	Four days	Five days	Six days
$1.00	10	20	30	40	50	60	70	80	90	25	50	75	2.00	3.00	4.00	5.00	6.00
1.25	12½	25	37½	50	62½	75	87½	1.00	1.12½	31¼	62½	93¾	2.50	3.75	5.00	6.25	7.50
1.50	15	30	45	60	75	90	1.05	1.20	1.35	37½	75	1.12½	3.00	4.50	6.00	7.50	9.00
1.75	17½	35	52½	70	87½	1.05	1.22½	1.40	1.57½	43¾	87½	1.31½	3.50	5.25	7.00	8.75	10.50
2.00	20	40	60	80	1.00	1.20	1.40	1.60	1.80	50	1.00	1.50	4.00	6.00	8.00	10.00	12.00
2.12½	21¼	42½	63¾	85	1.06¼	1.27½	1.48¾	1.70	1.91¼	53¼	1.06½	1.59½	4.25	6.37½	8.50	10.62½	12.75
2.25	22½	45	67½	90	1.12½	1.35	1.57	1.80	2.02½	56¼	1.12½	1.68¾	4.50	6.75	9.00	11.25	13.50
2.37½	23¾	47½	71¼	95	1.18¾	1.42½	1.66¼	1.90	2.13¾	59⅜	1.18¾	1.78	4.75	7.12½	9.50	11.87½	14.25
2.50	25	50	75	1.00	1.25	1.50	1.75	2.00	2.25	62½	1.52	1.87½	5.00	7.50	10.00	12.50	15.00
2.87½	28¾	57½	86¼	1.15	1.43¾	1.72½	2.01¼	2.30	2.58¾	72	1.43¾	2.15¾	5.75	8.62½	11.50	14.37½	17.25
3.00	30	60	90	1.20	1.50	1.80	2.10	2.40	2.70	75	1.50	2.25	6.00	9.00½	12.00	15.00	18.00
3.12½	31¼	62½	93¾	1.25	1.56¼	1.87½	2.18¾	2.50	2.81¼	78⅛	1.56¼	2.35⅛	6.25	9.37	12.50	15.62½	18.75
3.25	32½	65	97½	1.30	1.62½	1.95	2.27½	2.60	2.92½	81¼	1.72½	2.53¾	6.50	9.75	13.00	16.25	19.50
3.50	35	70	1.05	1.40	1.75	2.10	2.45	2.80	3.15	87½	1.75	2.63½	7.00	10.50	14.00	17.50	21.00
3.75	37½	75	1.12½	1.50	1.87½	2.25	2.62½	3.00	3.37½	93¾	1.87¼	2.70	7.50	11.25	15.00	18.75	22.50
4.00	40	80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	1.00	2.00	3.00	8.00	12.00	16.00	20.00	24.00

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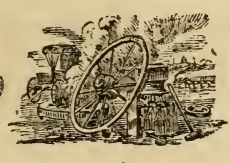

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